

The marine Heteroptera of the Eastern Tropical Pacific (Polhemus and del Rosario Manzano) are treated as the fauna of a natural biome rather than the artificial limitation of a particular geopolitical division. Similar studies of other biomes or specialized habitats will undoubtedly reveal significant insights into the assembly of tropical communities.

Another contribution requiring special note is the treatment of the leaf-rolling weevils (Coleoptera: Attelabidae) by the late George B. Vogt, who presents a long term field study of the host plant associations of these beetles over much of their North American ranges. In this same vein, Loye discusses the host plant relationships and ecological diversity of treehoppers (Homoptera: Membracidae and Nicomiidae). The study of immature stages and host plant associations is central to an understanding of the relationship and biology of many orders. The data are difficult to collect at best, and almost impossible for the visiting entomologist based outside of the tropics. This is the single most important opportunity presented to investigators working for extended periods in the tropics. This reviewer had anticipated that the pioneering work of Annette Aiello, who has spent many years rearing Lepidoptera in Panama, would be presented here, but it unfortunately was not. Other nonsystematic contributions cover aspects of dry season strategies of two butterflies, and the reproductive behavior of *Urania*.

Not everything in this volume is at the high level of the studies selected for comment. The biogeographic context in particular is weak. Significant biogeographical principles acting across the Panamanian land bridge are ignored, i.e., the angiosperm flora of Central American lowland rain-forest is identical to or derived from South America, whereas the montane flora of South America is of North American origin (Gentry, 1982).

Perhaps the first book a tropical naturalist should own is *Flora of Barro Colorado Island* (Croat, 1978), but now I recommend the purchase of *Insects of Panama and Mesoamerica* by every entomologist contemplating study in the Neotropics. This is a big, expensive book, but it would be a mistake to simply copy the chapter dealing with one's narrow interest and miss the opportunity to appreciate the magnificence of this tropical fauna as a whole. There are useful abstracts in English and Spanish as well as a taxonomic index.—Morton S. Adams, *Section of Invertebrate Zoology, Carnegie Museum of Natural History, 4400 Forbes Avenue, Pittsburgh, Pennsylvania 15213*.

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Caterpillars: Ecological and Evolutionary Constraints on Foraging.—N. E. Stamp and T. M. Casey (eds.). 1993. Chapman and Hall, New York. xiii + 587 pp. Hard cover. \$75.00 U.S.

Although butterflies and moths are the most well known and widely appreciated invertebrates, comparatively little attention has been given over to their larvae—the caterpillars—except as unwelcome guests in our gardens, forests, and crops. As a

whole caterpillars are extremely uniform morphologically relative to the immature stages of other insect orders. This is most apparent to the poor soul who must work with aged, alcohol preserved specimens that are devoid of their behavior and cryptic and warning coloration. This situation belies the virtual panoply of behaviors and stratagems that caterpillars employ just to survive in a world "hemolymph green in tooth and claw."

The caterpillar agenda is a simple one: eat and not be eaten. No sex, no distractions . . . avoid the enemies: inclement weather, the ever present predators and parasites, the pathogens looming on every leaf, competition from other herbivores, and legions of tiered plant defenses. The impact of these factors on the behavior, ecology, and evolution of caterpillars is the subject of this edited volume.

The book is divided into three parts. Eight chapters make up the first section which the editors identified as Constraints on Foraging Patterns of Caterpillars: "Effects of Temperature on Foraging of Caterpillars" (T. C. Casey), "Nutritional Ecology: The Fundamental Quest for Nutrients" (F. Slansky, Jr.), "Foraging with Finesse: Caterpillar Adaptations for Circumventing Plant Defenses" (David Dussard), "Patterns of Interaction Among Herbivore Species" (H. Damman), "Invertebrate Predators and Caterpillar Foraging" (C. B. Montllor and E. A. Bernays), "Potential Effects of Parasitoids on the Evolution of Caterpillar Foraging Behavior" (R. M. Weseloh), "How Avian Predators Constrain Caterpillar Foraging" (B. Heinrich), and "Why Body Size Matters" (D. Reavey). With but a couple exceptions, I found these chapters thoughtful and exceptionally comprehensive—Slansky had nearly 300 citations in his chapter. The natural history in Heinrich's and Dussard's chapters made for fascinating reading.

The second part of the book, Ecological and Evolutionary Consequences: Caterpillar Life-Styles, includes four chapters: "On the Cryptic Side of Life: Being Unapparent to Enemies and the Consequences for Foraging and Growth of Caterpillars" (N. E. Stamp and R. T. Wilkens), "Aposematic Caterpillars: Life Styles of the Warningly Colored and Unpalatable" (M. D. Bowers), "Sociality in Caterpillars" (T. D. Fitzgerald), and "The Effects of Ant Mutualism on the Foraging and Diet of Lycaenid Caterpillars" (M. Baylis and N. Pierce). All four chapters are strong contributions: interesting, informative, and very readable. The first three chapters, like many of the reviews in the first section, were loaded with citations—gold mines for anyone looking for "ins" to the literature on insect-plant interactions.

The last section of the book contains five chapters grouped under Environmental Variation in Time and Space: "Effects of Food and Predation on Population Dynamics" (E. Haukioja), "Caterpillar Seasonality in a Costa Rican Dry Forest" (D. H. Janzen), "A Temperate Region View of the Interaction of Temperature, Food Quality, and Predators on Caterpillar Foraging" (N. E. Stamp), "Biotic and Abiotic Constraints on Foraging of Arctic Caterpillars" (O. Kukal), and "Lepidopteran Foraging on Plants in Agroecosystems: Constraints and Consequences" (P. Barbosa). This section was a mixed bag, often containing the more speculative and narrowly focused chapters. But only the last was disappointing, there being little that wasn't treated with more rigor elsewhere in the book. Barbosa's use of qualifiers was irritating: 28 on pages 548 and 549, with as many as three in a single sentence.

Separate taxonomic and subject indices conclude the volume. I noted few editorial

problems, and these all trivial. Reproduction of plates and other printing aspects are quite good. The brash neon yellow hard cover should help you find your bearings even during a power outage.

The adaptationist program is alive and well and still producing frass. Few of the authors considered or even mentioned the importance of historical or phylogenetic influences on caterpillar evolution. Too often comparisons made between species are cross familial, even cross superfamilial or ordinal. Only Baylis and Pierce give phylogenetic considerations any serious mention. Clearly this is one of the most important shortcomings not only of the book, but of the studies in this discipline.

Overall, I found the volume outstanding, and well worth the price. The chapters are so thoroughly referenced and up-to-date that anyone studying herbivory or insect-plant interactions will need access to the book. All but Janzen's chapter are meant to be reviews. Nevertheless, many of the authors provide considerable unpublished data and observations. Hats off to the individual(s) who added the comprehensive subject and taxonomic indices. These are invaluable, especially to the occasional user. They make the book an important reference to a far larger audience of behaviorists, ecologists, and systematists. I have already found myself grabbing the volume to find out more about silk use in caterpillars, wasp predation, and notodontids, etc.—all made immediately accessible via the indices.

Laying aside technical aspects, I found most chapters interesting and enjoyable, some fascinating—what caterpillars lack in morphological diversity, they more than make up for in behavioral intricacy and complexity. I intend to bring many of the studies in "Caterpillars" into my classrooms. The authors and editors are to be congratulated for setting the table to which many researchers will now be drawn to carve out research programs of their own.—*David L. Wagner, Department of Ecology and Evolutionary Biology, The University of Connecticut, Storrs, Connecticut 06269.*

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The World of Nematodes.—David R. Viglierchio. 1991. agAccess, Davis, California. 266 pp. \$24.95.

Many entomologists' knowledge of nematodes is predominantly based on nematodes that are natural enemies of insects and vertebrate-pathogenic nematodes vectored by insects. A few more entomologists are probably aware of the diversity of plant pathogenic nematodes. This book does an excellent job at piquing further interest in this fascinating, ubiquitous, and abundant, yet little-known phylum. The author begins with some statistics that should intrigue and startle many entomologists: the exact number of nematode species is unknown but has been estimated as equal to the number of insect species. Yet, entomologists publish almost 9 times more manuscripts than nematologists, largely because there are few nematologists to study this speciose group.

Dr. Viglierchio's excitement with this subject permeates the pages. While the 13 chapters follow an expected progression of subjects, i.e., evolution, morphology and physiology, ecology, control, and human impact, the reader is captivated throughout